We claim:

1. A method for preparing a surface-chemical gradient on a substrate comprising

exposing the substrate to an advancing front of a first solution comprising a first adsorbate,

wherein the substrate is exposed to the first solution for a time period sufficient to adsorb the first adsorbate onto the surface in an amount decreasing in concentration from a first area on the substrate to a second area on the substrate.

2. The method of claim 1, further comprising exposing the substrate to a second solution comprising a second adsorbate.

3. The method of claim 1, wherein the surface-chemical gradient is a hydrophobicity gradient that changes the amount of water attracted to the surface over the length of the surface.

4. The method of claim 1, wherein the surface of the substrate is formed of a material selected from the group consisting of glass, metals, oxides, and synthetic polymers.

5. The method of claim 2, wherein the surface is gold and the first and second solutions comprise alkanethiols.

6. The method of claim 2, wherein the surface is an oxide and the first and second solutions comprise organic phosphates.

7. The method of claim 2, wherein the surface is an oxide and the first and second solutions comprise polyelectrolytes.

8. The method of claim 2, wherein the surface is a hydrophobic polymer and the first and second solutions comprise polyelectrolytes.

9. The method of claim 2, wherein the first or second adsorbate comprises a biomolecule.

10. The method of claim 1, wherein the substrate is exposed to the first solution using a linear-motion drive.

11. The method of claim 1, wherein the substrate is exposed to the first solution using a syringe pump.

12. The method of claim 2, wherein the substrate is exposed to the second solution by full immersion.

13 ~~14~~. A method of using a surface-chemical gradient for biological analysis comprising exposing the surface-chemical gradient to cells, wherein the surface-chemical gradient comprises a first adsorbate in an amount decreasing in concentration from a first area on the substrate to a second area on the substrate and a second adsorbate in an amount increasing in concentration from the first area on the substrate to the second area on the substrate.

14 ~~15~~. The method of claim 14, wherein the first or second adsorbate comprises a biomolecule.

15 ~~16~~. A method of using a surface-chemical gradient for analysis comprising exposing the surface-chemical gradient to a molecule, wherein the surface-chemical gradient comprises a first adsorbate in an amount decreasing in concentration from a first area on the substrate to a second area on the substrate and a second adsorbate in an amount increasing in concentration from the first area on the substrate to the second area on the substrate, and wherein the molecule preferentially binds with the first adsorbate.

16 ~~17~~. A surface-chemical gradient on a surface of a substrate comprising a first adsorbate in an amount decreasing in concentration from a first area on the substrate to a second area on the substrate and a second adsorbate in an amount increasing in concentration from the first area on the substrate to the second area on the substrate, wherein the substrate is 1 cm or longer in length.

17 ~~18~~. The surface-chemical gradient of claim 17, wherein the gradient is formed by exposing the substrate to an advancing front of a first solution comprising a first adsorbate, wherein the substrate is exposed to the first solution for a time period sufficient to adsorb the first adsorbate onto the surface in an amount decreasing in concentration from a first area on the substrate to a second area on the substrate.

and exposing the substrate to a second solution comprising a second adsorbate.

18 ~~19~~. The surface-chemical gradient of claim 17, wherein the gradient is suitable for analysis selected from the group consisting of cell-motility studies, diagnostics, microfluidics, nanotribology research, and high-throughput screening.